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Low nitrous oxide production in intermittent-feed high performance nitrifying reactors

Qingxian Su*, Marlene M. Jensen*, Barth F. Smets*

* Department of Environmental Engineering, Technical University of Denmark, 2800, Lyngby, Denmark

Nitrous oxide, nitrification, ammonia-oxidizing bacteria, nitrous oxide production pathways, intermittent feeding, pH

Summary

Nitrous oxide (N₂O) production from autotrophic nitrogen removal processes, especially nitrifying systems, is of growing concern. N₂O dynamics were characterized and N₂O production factors were quantified in two lab-scale intermittent-feed nitrifying SBRs. 93 ± 14% of the oxidized ammonium was converted to nitrite, with the average total net N₂O production of 2.1 ± 0.7% of the ammonium oxidized. Operation with intermittent feeding appears an effective optimization approach to mitigate N₂O emissions from nitrifying systems. Net N₂O production rates transiently increased with a rise in pH after each feeding, indicating a potential role of pH in N₂O production.